

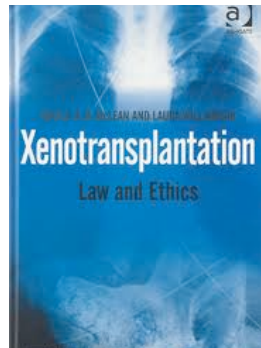
Alternatives to human organ transplants: Part II: Xenotransplants

US275 Scientific Ethics
John R. Hoffman
Arcadia University



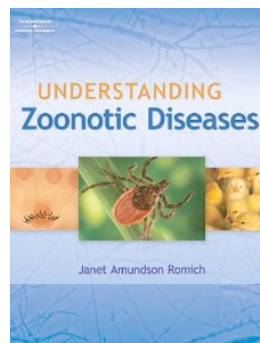
Xenotransplantation is the implantation of nonhuman animal cells into a human recipient

- “acceptable” source of biological tissues and organs
 - when human sources are limited
 - when human sources have ethical concerns (example fetal tissues)



Xenotransplantation is associated with risk of a zoonotic infection.

- potential zoonotic (cross-species) infection
 - by known pathogens
 - by unknown pathogens or unidentified pathogens
 - including retroviruses that may be dormant for long periods of time.



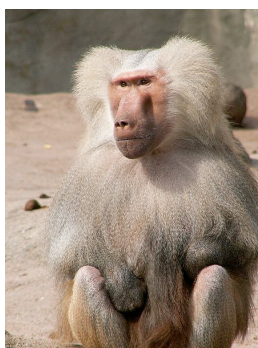
Patients that receive xenotransplants are subject to special conditions.

- recipients and close contacts of xenotransplants are expected to refrain from blood donation.
- recipients must agree to life-long monitoring



Examples of xenotransplantation

- Chimpanzee kidneys for patients in kidney failure (1960s)
- Baboon heart (1984)
- Baboon liver for patients with hepatic failure
- after 1992
 - Pig skin on burn patients
 - Pig neuronal cells for patients with Parkinson's disease and Huntington's disease



Baboon, Papio hamadryas
Wikimedia Commons

Pigs are a preferred source for xenotransplant tissues and organs.

- quick to mature, bred in captivity
- vital organs comparable in size to human
- extensive history of human-pig contact so risk of new infectious diseases is limited
- HOWEVER
 - immune system concerns



Piglet
USDA.gov

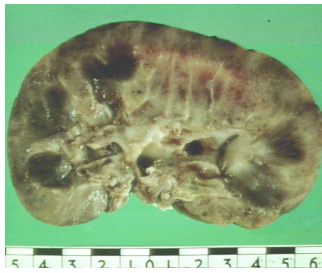
Xenotransplantation has the same concerns as poorly matched human-human transplants

- health of donor
 - infectious disease-free
- immune system rejection
 - immunosuppression drugs



Pig to human transplants are associated with hyperacute or delayed rejection.

- human immune system response
 - identifies and kill pig cells
- Creating strains of pigs that are less immunogenic
 - breeding or genetically altering pigs
 - express fewer of the immune system triggering molecules



<http://pathmicro.med.sc.edu/ghaffar/mhc2000.htm>

Assignment

Assignment

Xenotransplant cost and benefits?

There is an unknown level of risk of zoonotic infection associated with a xenotransplant, so research on the long-term effects must be monitored. Any patient that receives a xenotransplant agrees to continued restrictions and life-long medical monitoring. This agreement to these conditions violates the rights of an individual to withdraw as a research subject provided in the Declaration of Helsinki, the United States Office of Human Research Protections, and the U.S. Food and Drug Administration. An individual considering a xenotransplant is normally facing imminent death. Therefore, the patient is likely to feel some level of coercion to almost any condition in order to receive the desired life-extending treatment.

In your discussion group: Do the benefits to a recipient of a xenotransplant outweigh the costs to the patient and the risk to their family (and/or society) if a zoonotic disease develops?

Readings

Xenotransplants: Using animal organs to save human lives. Bruce Agnew. Research in the News, Snapshots of Science and Medicine.

<http://science.education.nih.gov/snapshots.nsf/story?openform&rtm~xenotransplantsritn>

Prospects for xenotransplantation: Scientific aspects and Ethical Considerations. Pontifical Academy for Life. http://www.vatican.va/roman_curia/pontifical_academies/acdlife/documents/rc_pa_acdlife_doc_20010926_xenotrapianti_en.html



Woman Reading in Bed
Gabriel Ferrier

Any Questions?

Email me at:
hoffmanj@arcadia.edu



<http://www.xipitbullennets.com/images/animated-question-mark.gif>